

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Copy

FEB 13 1935

UNITED STATES
DEPARTMENT OF AGRICULTURE
CIRCULAR No. 370

Washington, D. C.

November 1935

FOOD HABITS
OF
COMMON HAWKS

By

W. L. McATEE

Principal Biologist and Technical Adviser, Office of the Chief
Bureau of Biological Survey







FOOD HABITS OF COMMON HAWKS

By W. L. MCATEE, *principal biologist and technical adviser, Office of the Chief Bureau of Biological Survey*

CONTENTS

| | Page | | Page |
|--|------|------------------------------------|------|
| Introduction..... | 1 | The more common species—Continued. | |
| Economic value of the prey of hawks..... | 2 | Sharp-shinned hawk..... | 9 |
| Domestic poultry..... | 2 | Cooper's hawk..... | 10 |
| Game birds..... | 3 | Red-tailed hawk..... | 12 |
| Nongame birds..... | 3 | Red-shouldered hawk..... | 15 |
| Mammals..... | 4 | Broad-winged hawk..... | 17 |
| Frogs, toads, and reptiles..... | 4 | Swainson's hawk..... | 19 |
| Insects..... | 4 | American rough-legged hawk..... | 20 |
| Attitude toward predators..... | 4 | Ferruginous roughleg..... | 22 |
| Groups and species of hawks..... | 5 | Golden eagle..... | 24 |
| Blue darters..... | 5 | Bald eagle..... | 24 |
| Mouse hawks, or buteos..... | 5 | Marsh hawk..... | 26 |
| Eagles..... | 7 | Osprey..... | 28 |
| Marsh hawks..... | 7 | Prairie falcon..... | 28 |
| Fish hawks..... | 7 | Duck hawk..... | 30 |
| Falcons..... | 7 | Pigeon hawk..... | 31 |
| The more common species..... | 7 | Sparrow hawk..... | 33 |
| Goshawk..... | 7 | Conclusions..... | 35 |

INTRODUCTION

Hawks are predators. They live chiefly by killing and eating other creatures, but they should not on that account be regarded as a class apart and forthwith condemned. "Eat or be eaten" is a general rule of animal life, and the great majority of vertebrate animals are to some degree carnivorous. There is no essential difference between the insect eaters and the mouse and bird killers; every gradation in predaciousness occurs. Many birds prey chiefly upon insects, but some add worms, or snails, or spiders to their diet; others, according to their prowess, take frogs and toads, or lizards and snakes; while still others capture mice or shrews, ground squirrels or rabbits, bats or birds. Some—among them hawks—eat practically all these things.

A whole series of birds averaging as large in size as the hawks prey chiefly on fishes; and some of these, as the gulls and the herons, often include in their menus rodents, birds, and birds' eggs. Lower down the scale in size are birds other than hawks that prey upon vertebrates—among them the crows, the roadrunner, magpies, kingfishers, the chuck-will's-widow, jays, grackles, and shrikes. Whenever they have an opportunity most of these also eat mammals, reptiles, and fishes. Such species as the kingbird, the catbird, and the robin take an occasional fish or snake, and even so tiny a bird as the Carolina wren preys regularly on small lizards. Egg predators include lizards,

snakes, mammals, and birds. One eminent economic ornithologist was fond of remarking that he did not believe the bird lived that could resist the temptation to eat another bird's eggs.

Birds, mammals, snakes, lizards, and at least the snapping turtle and the bullfrog of their respective races, prey upon, and in turn are eaten, by each of the others. The interrelations of these and of other forms of life entering into the predation complex are so intricate and involved that offhand judgments upon them by casual observers should be entirely taboo. Certainly hawks do not stand alone as predators, and the fact of predation alone is clearly no guide to policy regarding the protection of an animal. Rather, before judgments are entered or action taken, consideration should be given to all available evidence as to the harm or good ultimately resulting from choice of food.

Opinions about the utility of hawks usually rest on relatively few observations. A hunter once in his life may have flushed a hawk from a recently killed game bird, or a farmer may have been pestered one spring by a pair of nearby nesting blue darters; thereafter they see nothing but evil in hawks. While these personal experiences leave strong impressions, they should not be allowed to exclude reasoned consideration of other evidence.

When stomach analysis reveals that only one quail was represented in a total of 391 meals of red-shouldered hawks, hunters' recollections of the capture of quail by these hawks should in justice be given their true value, namely as unusual happenings, not at all a fair basis on which to formulate a policy toward the species. Similarly, the fact that examination of 145 stomachs of broad-winged hawks revealed no traces of poultry should indicate to the farmer the desirability of identifying hawks before taking summary action, and of sparing the broad-winged and other hawks of equally blameless habits.

ECONOMIC VALUE OF THE PREY OF HAWKS

DOMESTIC POULTRY

The complaints about depredations of hawks upon poultry are more numerous than those referring to any other kind of prey. It is difficult to conceive of circumstances under which the destruction of poultry would be anything but an injury, so all cases of hawks' preying upon domestic fowls may properly be recorded on the debit side for these birds in account with man. It should not be forgotten, however, that something can be done to protect poultry from hawks;¹ in fact, at present on the well-managed modern poultry ranch the birds are very little exposed to attacks from hawks. It would seem economically feasible to extend further protection to fowls by providing poultry houses and wire-enclosed runs. If this were done, not only would valuable poultry be saved, but the predatory activities of hawks so far as they are now directed against domestic fowls would be diverted, and greater consumption of other, economically less valuable elements of their food would result, among which the one likely to be most affected is mice.

¹For further discussion of this matter see United States Department of Agriculture Leaflet 96, Protecting Poultry from Predacious Birds.

GAME BIRDS

Game birds where artificially propagated, or even in the coverts of well-managed preserves, have the same status as poultry, and in such places their destruction by hawks may be rated as direct financial loss. Game birds in the wild, for the production of which man can claim little if any credit, constitute a different case, however, and there it is not justifiable to lay such serious charges against the hawks for depredations upon them. In the first place, the eating of such game birds causes no direct financial loss; it is not, as in the cases previously discussed, confiscation of the products of husbandry. In the second place, the hawks concerned have an esthetic, and perhaps an economic, value that emphasizes their equality with various other groups in deserving protection or at least tolerance from man. It is not fair to predacious birds, to wildlife in general, or to the public to attempt to apply "vermin"-control ideas as developed on game farms and intensively managed preserves to other environments. Many of the so-called "vermin" species are fur-bearing animals, which individually may be worth far more than game birds; others, including hawks, are creatures the persecution of which for various reasons may be contrary to public interest.

It would seem fair to take the same view of hawks' killing game birds in the wild as of their destroying any other useful birds. In other words, catching wild game birds should not be regarded as a capital offense but as an ordinary depredation, to be considered in connection with the general record of the hawks and their needs, and balanced against the good they do in eliminating injurious creatures.

NONGAME BIRDS

Hawks eat many small nongame birds; in fact, such hawks as the blue darters and some of the falcons subsist principally on such prey. In estimating the harm or good done in this way one should consider the economic tendencies of the birds consumed.

Some groups of birds, including cuckoos, swifts, swallows, flycatchers, vireos, warblers, and wrens, are so highly insectivorous that they are mainly beneficial, and their destruction by hawks must be charged against these predators. Others, as robins, catbirds, cedar waxwings, blackbirds, and horned larks, are sometimes beneficial and sometimes injurious, so that from the economic point of view their consumption by hawks is not so great a loss. Still others, as crows, jays, the starling, the English sparrow, and the California house finch, have more dubious economic records, and their loss is accordingly less regrettable. A very large group of native birds—the sparrows—feed extensively on plant seeds, and even if these should be mostly weed seeds, their removal cannot be valued so highly as an equivalent destruction of insects. Many of the birds in this assemblage are about neutral economically.

To sum up, the capturing of birds may be judged much as are depredations on insects, that is, according to the economic tendencies of the forms involved, not all good nor all bad, but each case on its own merits. It should not be forgotten, moreover, that checks on the multiplication of birds are part of the established scheme of things. Relieved of checks, these birds themselves might increase

to an extent that would force man to reduce their numbers in self-defense. The favorable conditions of civilization have already permitted such an overabundance of robins in the East and of house finches in the West that demands are made for their control. One should not be too severe, therefore, on the natural enemies of small birds, since in moderation their work is not harmful.

MAMMALS

The mammals most frequently eaten by hawks are mice, and the economic tendencies of these creatures in relation to man are chiefly harmful. Most mice eat some insects; some groups, such as the grasshopper mice, are themselves rather highly insectivorous. In general, however, since mice are pilferers in grainfields, pests of root crops, and destroyers of orchards, all checks on them should be welcomed by man.

Where they affect agriculture at all, the spermophiles and pocket gophers clearly do more harm than good, and predation on them by hawks is praiseworthy. Chipmunks and tree squirrels are both beneficial and harmful in their feeding habits, and have some value as game. Rabbits, though having no credit on the score of food habits, are in some regions of great value as game. These animals often need to be controlled, however, and sometimes they become downright pests. It does not seem fair or wise, therefore, to censure hawks for depredations on them. Too often there is cause to wish that hawks or something else had eaten more of them—so a police force in time of peace should not be condemned when it will be greatly needed in time of trouble.

Shrews and bats, also mammals eaten by hawks, are largely insectivorous and therefore chiefly beneficial. Their destruction is thus a debit in the account of hawks with man.

FROGS, TOADS, AND REPTILES

Some species of frogs, toads, lizards, and snakes are rather highly beneficial, while others are mostly injurious; on the whole, these groups may be rated as moderately useful and their consumption a somewhat undesirable activity on the part of hawks.

INSECTS

The insects eaten by hawks are mostly grasshoppers, crickets, and their allies and caterpillars—vegetarian creatures that are potentially, even when they are not actually, enemies of man. Included in their food also are adults of white grubs and wood borers, both economically undesirable, and ground and tiger beetles, which are somewhat beneficial. They also consume a great many dragonflies, which may well be termed the hawks of the insect world.

ATTITUDE TOWARD PREDATORS

No more need be said to emphasize that the relations between predators and prey constitute a maze that the most fully informed cannot thread unerringly, and one that all others rather than attempt

by force had much better avoid entirely. Interference with animal relationships has effects that cannot be undone, and should be undertaken only after the fullest consideration of all the information obtainable.

GROUPS AND SPECIES OF HAWKS

Thirty-five species of hawks have been recorded as residents or visitants in North America north of Mexico, but several are so seldom observed that their economic value is not a matter of public interest. Only half the entire number are treated in the following pages, and a few of these, through their partiality to restricted habitats or as a result of suppression by man or his operations, cannot be considered really common. The standard English and technical names here used, and the statements of ranges are those given in the Check-List of North American Birds, of the American Ornithologists' Union (fourth edition).

The 17 species of hawks here discussed (fig. 1) fall into 6 well-defined groups, which may be named and commented upon as follows:²

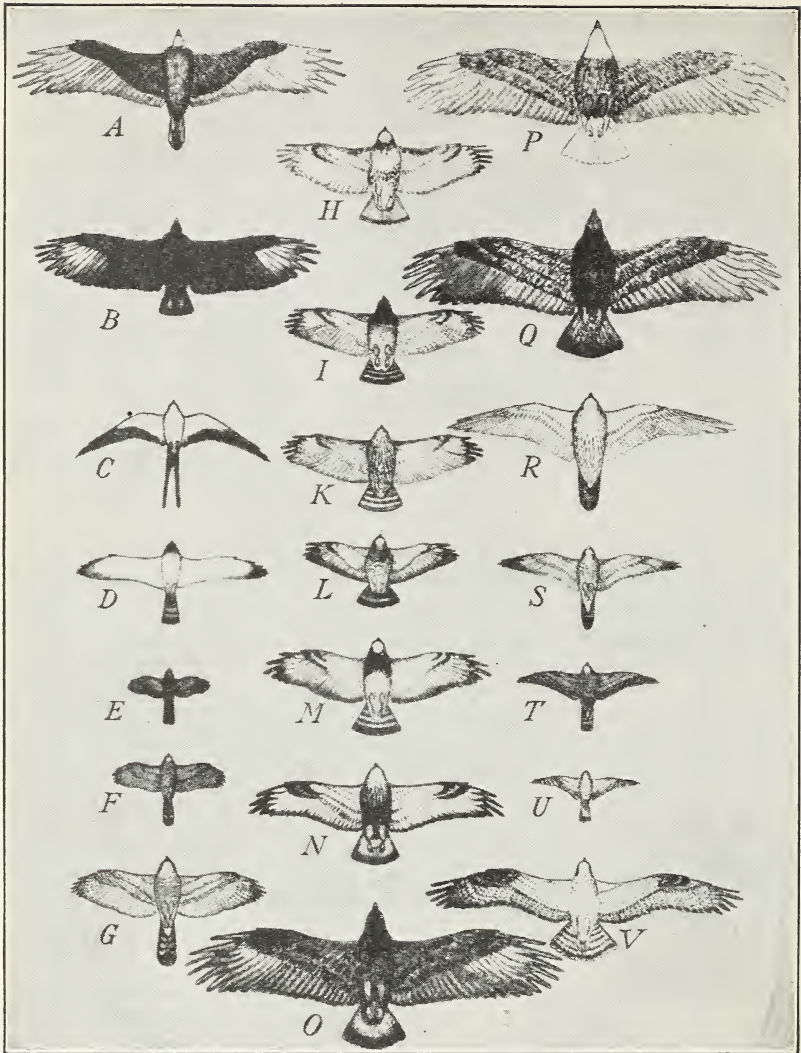
BLUE DARTERS

The goshawk, sharp-shinned hawk, and Cooper's hawk are the hawks ordinarily called blue darters. They are elusive species, keeping more closely to cover than any of the other groups. Occasionally, as in migration, they get up in the air and circle and soar, but ordinarily with quick even strokes alternating with short sails, they skim about close to or even among trees or shrubbery, pouncing abruptly upon their prey. When on the kill these bird hawks are audacious, snatching prey from under man's very nose, and persistent, following hoped-for victims into and through cover, and even into buildings. The blue darters at other times may steal silently near an object of interest and perch quietly for a time, observing the scene before taking any more decided action. Blue darters have long, narrow tails and comparatively short, rounded wings. The wings are barred and the body streaked (figs. 1, *E* to *G*; and 2 to 4).

MOUSE HAWKS, OR BUTEOS

The hawks ordinarily known as "mouse hawks" are the red-tailed hawk, red-shouldered hawk, broad-winged hawk, Swainson's hawk, American rough-legged hawk, and ferruginous roughleg. Almost anywhere in the United States a large hawk posing long on a conspicuous perch, soaring about in lazy circlings, or hovering usually more clumsily than that expert, the sparrow hawk, is likely to be one of the mouse hawks, or buteos. These hawks show themselves more in the open and are not so alert, swift, or elusive as the blue darters, and being easier victims of the gun, often suffer for the misdeeds of that group. They have broad, short tails, and broad wings, the underside of which shows a dark marking at the wrist (figs. 1, *H* to *N*; and 5 to 10).

²Further notes on recognition of the members of these groups are contained in the accounts of the species (pp. 7 to 35).



B5674M

FIGURE 1.—Common birds of prey as seen in flight—field identification marks accentuated to facilitate recognition; all adult male birds unless otherwise indicated (from Birds of Massachusetts and other New England States; courtesy of John B. May).

VULTURES AND KITES :

- A, Turkey vulture
 B, Black vulture
 C, Swallow-tailed kite
 D, Marsh hawk

BLUE DARTERS :

- E, Sharp-shinned hawk
 (immature male)
 F, Cooper's hawk (small
 adult male)
 G, Goshawk

MOUSE HAWKS :

- H, Red-tailed hawk
 I, Red-shouldered hawk
 K, Red-shouldered hawk
 (immature)
 L, Broad-winged hawk
 M, Swainson's hawk
 N, Rough-legged hawk
 (immature light
 phase)
 O, Golden eagle

BALD EAGLES :

- P, Adult
 Q, Immature

FALCONS :

- R, White gyrfalcon
 S, Duck hawk
 T, Pigeon hawk
 U, Sparrow hawk
 V, Osprey

EAGLES

Size alone will distinguish the golden eagle and the bald eagle from the other hawks, and only the vultures (fig. 1, *A* and *B*) are likely to be confused with them in flight. The latter, however, make soaring a much greater share of their total flying activities. The steady beat of long sweeping wings need not be noted long to remove all doubt that an eagle, not a vulture, is under observation (figs. 1, *O* to *Q*; and 11 and 12).

MARSH HAWKS

There is only one species, the marsh hawk, which beats back and forth over marsh, meadow, and grasslands with a floppy sort of flight, dropping on the prey it surprises in openings (figs. 1, *D*; and 13).

FISH HAWKS

There is only one species of American hawk, the osprey, that gets practically all its food from water (figs. 1, *V*; and 14).

FALCONS

Hawks of the falcon group—the prairie falcon, duck hawk, pigeon hawk, and sparrow hawk—have distinctly pointed wings, rapid wing beats, and a swallowlike or pigeonlike flight. They are so expert a wing that they take much of their prey in the air. The familiar little sparrow hawk (fig. 1, *U*) is an exception in this respect; it is furthermore the only species of falcon that is both generally distributed and numerous (figs. 1, *R* to *U*; and 15 to 17).

THE MORE COMMON SPECIES

GOSHAWK

Eastern goshawk (*Astur atricapillus atricapillus*).—Breeds in the Boreal zones from northwestern Alaska, northwestern Mackenzie, northern Manitoba, southeastern Ontario, northern Quebec (Ungava), and Newfoundland south to interior British Columbia, Michigan, northern New York, northern New England, Massachusetts (casually), and, in the mountains, as far south as Pennsylvania and western Maryland. Winters from Alaska and the southern Canadian Provinces to southern California, northern Mexico, Texas, Oklahoma, Missouri, Kentucky, Illinois, Indiana, northern Ohio, West Virginia, and Virginia; migrations periodic and irregular. Casual or accidental in Idaho, Arizona, and Florida.

Western goshawk (*Astur a. striatulus*).—Breeds in Boreal zones of the Pacific coast region from Cook Inlet, Alaska, possibly south to California in the central Sierra Nevada (Yosemite National Park), Arizona, New Mexico, and Chihuahua. Winters through much of its breeding range and south to southern California (vicinity of San Diego) and northern Mexico.

RECOGNITION

Largest of the blue-darter group (p. 5); tail long, its posterior angles rounded; adults with crown and stripe behind eye black, stripe over eye white; and lower parts both longitudinally streaked and crossbarred. Length, 20 to 26 inches; spread, 40 to 47 (figs. 1, *G*; and 2).

CONTENTS OF STOMACHS

Poultry was found in 116 stomachs, or nearly half the 243 examined, the remains in one case being identified as those of guinea fowl. Grouse, chiefly ruffed grouse, were determined in 31 of the stomachs, ptarmigan in 2, and quail in 1. Introduced game birds were represented in some of the more recently collected material—pheasants in 5 instances and the European partridge in 1.



B3806M

FIGURE 2.—Goshawk.

All these victims belong to the group of gallinaceous birds, prized as food and game by man, but the goshawk, with a broader definition of game, brings to bag some rather unsuspected victims, as for instance a sharp-shinned hawk, a screech owl, and a crow, remains of which were detected in one stomach each. Evidently "eating crow" is not too great a hardship in the hawk world. A herring gull and a pintail duck were among the birds taken. In nine instances smaller species, ranging in size from the mourning dove to the hermit thrush, had been captured.

Next to large birds, rabbits are most relished, having been taken by 45 of the 243 goshawks here reported upon. Squirrels, found in 22 stomachs, are next in order and include the red and gray tree squirrels,

flying squirrels, chipmunks, and spermophiles. Mice, chiefly deer mice, but also some meadow mice, were identified from 8 stomachs, and the following mammals in 1 stomach each: Woodchuck, muskrat, kitten, weasel, and shrew. A few grasshoppers and caterpillars, found in 4 stomachs, complete the list of food items.

STATUS

The goshawk, the largest of the bird hawks, is fierce, audacious, and armed with the most deadly talons of any of the birds of prey. It is able to take what it wants, and as a rule apparently it wants things of value to man. On the economic side, there is comparatively little that can be said in its favor.

SHARP-SHINNED HAWK

The sharp-shinned hawk (*Accipiter velox*) breeds nearly throughout the United States and Canada from northwestern Alaska, Mackenzie (Great Bear Lake), northern Manitoba, northern Ontario, central Quebec, southern Labrador, and Newfoundland south to northern Florida, the Gulf coast, Texas, Arizona, and west-central California. Winters from southeastern Alaska, southern British Columbia, western Montana, southern Minnesota (casually), northern Nebraska, Indiana, Illinois, Ohio, New York, southern Vermont, southern New Hampshire, and New Brunswick (casually), to Guatemala, and (casually) Panama. Accidental in the Bahamas.

RECOGNITION

Smallest of the blue darters (p. 5). Tail long, narrow, with the posterior angles square. Length, 10 to 14 inches; spread, 20 to 27 (figs. 1, *E*; and 3).

CONTENTS OF STOMACHS

Remains of poultry were found in only 2, and remains of game birds in only 5, of the 944 stomachs examined. The game birds were quail in 4 instances and woodcock in 1. Sharp-shinned hawks prey constantly upon the smaller birds, however, and bird remains, representing 20 bird families, were found in nearly all stomachs.

Corresponding to their greater abundance, sparrows were most frequently taken; some of the prevailing groups of finch prey, with the number of records of their capture, were as follows: Song sparrows and allies (*Melospiza*), 82; English sparrow, 45; chipping sparrows and allies (*Spizella*), 45; chewinks, 38; sharp-tailed sparrows (of 4 genera), 19; crowned sparrows (*Zonotrichia*), 16; juncos, 16; vesper sparrows, 15; and purple finches, 14.

Warblers rank next to sparrows as prey for the sharp-shinned hawk, and species of the genus *Dendroica* were identified in 175 stomachs; ovenbirds and their allies (*Seiurus*) in 29; yellowthroats (*Geothlypis*) in 15; and the so-called "flycatching warblers" (*Wilsonia*) in 10.

Remains of robins were determined in 56 stomachs, bluebirds in 13, and those of the related thrushes (*Hylocichla*) in 47. Vireos fell victims to 44 of the sharp-shinned here reported upon, and swallows to 29. The blackbird group was fairly well represented, although some kinds, as meadow larks and grackles, are larger than average prey for this hawk. The very largest birds revealed in the examina-

tions, other than the poultry and game species previously mentioned, included a sparrow hawk, a mourning dove, and a band-tailed pigeon, each identified in a single stomach.

Seemingly no hawk entirely avoids mice, and the sharp-shinned, though a pronounced addict to bird flesh, occasionally takes mice and other mammals. Meadow mice were found in 8 stomachs, house mice in 1, and other kinds, chiefly deer mice, in 16. Bats were taken by 2 of the birds, and a shrew, a squirrel, and a rabbit by 1 each.



B3191M

FIGURE 3.—Sharp-shinned hawk.

A lizard also was identified in a single stomach, grasshoppers in 4 (1 containing 48 individuals), caterpillars in 1, and other insects in 7 (dragonflies in 2 cases).

STATUS

The sharp-shinned hawk feeds very largely on birds, and since birds in general are useful, the economic tendencies of the sharp-shinned are harmful.

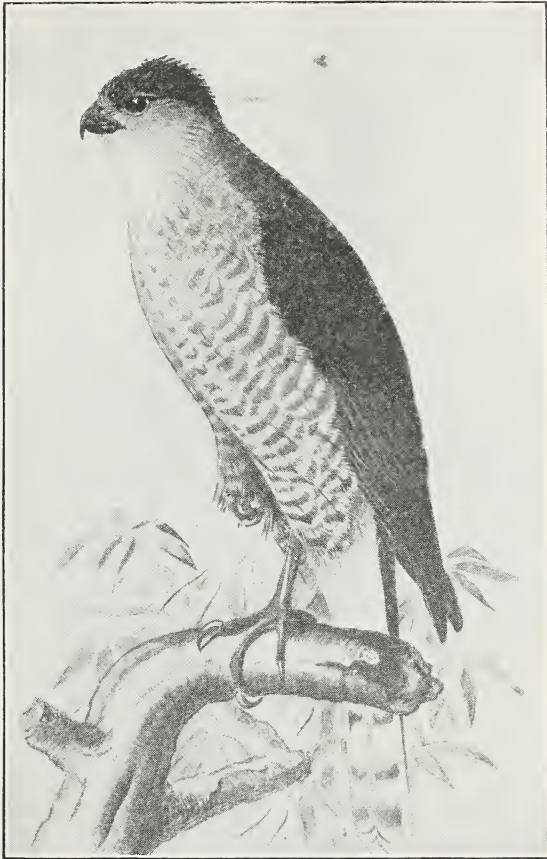
COOPER'S HAWK

The Cooper's hawk (*Accipiter cooperi*) breeds from southern British Columbia, central Alberta, southern Ontario, southern Quebec, and Prince Edward Island to the southern border of the United States and northern Mexico. Winters from southwestern British Columbia, Washington, California, Colo-

rado, Nebraska, southern Illinois, Indiana, Ohio, southern Michigan (rarely), southern Ontario (rarely), southern New York, Massachusetts, and southern Maine to Costa Rica.

RECOGNITION

Characters of the blue darter group (p. 5): Tail long, the posterior angles rounded. Of medium size for its group, length, 14 to 20 inches; spread, 27 to 36 (figs. 1, *F*; and 4).



B3904M

FIGURE 4.—Cooper's hawk.

CONTENTS OF STOMACHS

Remains of poultry were found in 32, quail in 16, pheasants in 10, grouse in 4, and partridge in 1 of the 261 stomachs examined. The last-named bird was the introduced European, or Hungarian, partridge; the quail eaten included the bobwhite, the California valley quail, Gambel's quail, and the mountain quail; while the grouse were of two species, ruffed and spruce.

Other birds, found in a total of 164 stomachs, comprised a large category that may well be further analyzed. Prey is taken, as a rule, where most easily obtained, not only by Cooper's hawks but by

all predators, and consequently the greatest toll is collected from the groups most numerous in individuals. Among birds taken by Cooper's hawk, the sparrow tribe thus bears the brunt of predation, being represented in 84 of the 261 stomachs. The various species of song sparrows and their allies (*Melospiza*) were most frequently taken (in 24 stomachs), the English sparrow next (17), followed by such groups as the chewinks, juncos, crowned sparrows, and the chipping sparrow and its congeners (*Spizella*).

Woodpeckers seem easy prey for this hawk, having been taken by 11 Cooper's hawks, 7 of the victims being flickers. The blackbird tribe; the thrushes and robins, and the warblers and vireos were other groups of birds frequently preyed upon. Some of the more striking captures of Cooper's hawks included a least bittern, a screech owl, a pigeon hawk, and a sparrow hawk, each of which occurred in a single stomach.

Being a bird hawk does not keep the Cooper's hawk from devouring an occasional mammal. Meadow mice, the grand staple for hawks in general, were found in 8 stomachs, other mice in 2, a house rat in 1, and a cotton rat in 1; squirrels, largely chipmunks and red squirrels, had been taken by 22 of the birds, rabbits by 4, spermophiles by 3, and a shrew by 1.

Snakes and lizards, frogs, and toads were laid under slight contribution. The toll of grasshoppers and other insects was somewhat higher, one stomach containing 24 grasshoppers and another 17. Among other insects taken were crickets, beetles, dragonflies, and butterflies, one stomach yielding 9 of the last named.

STATUS

The verdict in the case of Cooper's hawk is the same as for the sharp-shinned, except that as the bird is larger it has greater predatory capacities, which are chiefly in undesirable directions.

RED-TAILED HAWK

Eastern red-tailed hawk (*Buteo borealis borealis*).—Breeds from Mackenzie, Saskatchewan, northern Manitoba, northern Ontario, southern Quebec, and Newfoundland south to central southern Texas, northeastern Oklahoma, Arkansas, Alabama, and northern Florida. Winters from Kansas, northeastern Iowa, southern Illinois, Indiana, Ohio, central New York, Vermont, New Hampshire, and southern Maine to northeastern Mexico and the Gulf coast of the United States.

Florida red-tailed hawk (*Buteo b. umbrinus*).—Southern Florida, Cuba, and the Isle of Pines.

Krider's hawk (*Buteo b. krideri*).—Breeds from southern Alberta, southern Saskatchewan, southern Manitoba, Wyoming, North Dakota, and Minnesota south to Nebraska and Missouri. Winters south to Wisconsin, Illinois, Louisiana, and Mississippi. Accidental in Florida and Georgia.

Western red-tailed hawk (*Buteo b. calurus*).—Breeds from southeastern Alaska and central western Mackenzie south to southern Baja California and east to the edge of the Great Plains. Winters from southwestern British Columbia and throughout California to Guatemala. Casual farther east in migration.

Harlan's hawk (*Buteo b. harlani*).—Breeds in northwestern British Columbia, southwestern Yukon, and adjoining parts of Alaska south at least to southern Alberta; in winter down the Mississippi Valley to the Gulf States; casual in California.

RECOGNITION

The large red-tailed hawk is noticeably more broad-shouldered and more heavily built than the red-shouldered hawk; the breast is usually white; the dark streaking usually is concentrated on the abdomen, and the tail, without crossbars except a terminal one, is often red, this character being best seen when light is shining through it. Length, 19 to 25 inches; spread, 46 to 56 (figs. 1, *H*; and 5).



B3801M

FIGURE 5.—Red-tailed hawk.

CONTENTS OF STOMACHS

Remains of domestic fowls were found in 60 of the 754 stomachs, or in about 1 out of 12; this is a fair indication that about every twelfth meal of the redtail consists of chicken. Game birds were represented in the stomachs as follows: Wild ducks in 4, ruffed grouse in 3, sharp-tailed grouse in 1, prairie chicken in 1, pheasants in 3, European partridge in 1, bobwhite in 2, and scaled quail in 2. Seventeen, or about 2.25 percent of all the redtails examined, had therefore been eating game birds. Crows, although reputed undesirable food, were found in 8 stomachs.

A screech owl had been eaten by 1 of the redtails, and miscellaneous smaller birds had been taken by 59, or a little less than 6 percent of the total number. The groups most commonly preyed upon were the sparrows (song sparrows in 15 stomachs), meadow larks (in 7) and their relatives, and the robin (in 6) and its allies.

Mammals preyed upon by the red-tailed hawk include squirrels, remains of which were found in 80 of the 754 stomachs, and rabbits in 64. Shrews, small mouselike animals that feed chiefly upon insects, and are therefore beneficial, were eaten by 63 of the redtails here reported upon; and moles and bats, which are useful for similar reasons, had been eaten by 7 and 2 of the hawks, respectively. Shrews usually numbered 1 to a stomach, but rarely 2 or 3 occurred and in a single instance 15. Among fur-bearing animals taken by the redtails were 1 muskrat and 1 skunk.

Of the more strictly injurious mammals consumed by this hawk, meadow mice were eaten by 228 individuals, house mice by 28, and other mice by 129. Approximately half, therefore, of the total number of red-tailed hawks had been feeding upon mice; in a number of cases 4 or 5 had been taken at a meal, and in one instance 7. Rats of different kinds were eaten by the following number of individuals: Wood rats by 2, cotton rats by 10, and house rats by 13. Other mammal prey included pocket gophers taken by 13 birds, spermophiles, or ground squirrels, by 39, porcupine by 1, and woodchuck by 1.

While red-tailed hawks depend chiefly on birds and mammals for their food, they take a considerable variety of other creatures, which may be briefly mentioned. Among these, grasshoppers are notable, having been found in 61 (nearly 8 percent) of the total number of stomachs, in numbers up to 25. Caterpillars were identified in 4 stomachs, and other insects of a considerable variety of species in 41. Other jointed animals, the large group to which insects belong, consumed by redtails, are crawfishes in 12 stomachs, spiders in 3, and centipedes in 1. Of these three groups, the first named are chiefly injurious and the last two more or less beneficial. Snakes were eaten by 32 redtails, frogs by 13, toads by 8, lizards by 4, and salamanders and turtles by 1 each. Among serpents captured are the bull, garter, hog-nosed, and flat-nosed snakes and the red racer; in a few cases two individuals were taken at a meal.

STATUS

The redtail is not entirely undeserving of its common name hen hawk, and where the protection of poultry by keeping it chiefly in pens and runs is impracticable, the redtail is one of the hawks that must be combated. Depredation upon game birds does not appear to be excessive. The redtail is a good mouser, and in its selection of mammal food the bird does more good than harm. The same may be said of its attention to insects, and probably only slight harm is done by its feeding on reptiles and amphibians. The record of the redtail is entirely different from that of the blue darters, but as it is a powerful species, able to take poultry at any time, it is subject to control under some circumstances.

RED-SHOULDERED HAWK

Northern red-shouldered hawk (*Buteo lineatus lineatus*).—Breeds from Ontario, southern Quebec, Nova Scotia, and Prince Edward Island south to southern Kansas, northeastern Tennessee, and North Carolina and west to the edge of the Great Plains. Winters from central Iowa, Illinois, Indiana, southern Ohio, southern Ontario, central New York, southern New Hampshire, and southern Vermont, south to the Gulf coast and Texas.

Florida red-shouldered hawk (*Buteo l. alleni*).—Lower Austral Zone of the Southern States from Oklahoma, Arkansas, Alabama, and South Carolina to Louisiana and southeastern Florida.

Insular red-shouldered hawk (*Buteo l. extimus*).—Florida Keys.

Texas red-shouldered hawk (*Buteo l. texanus*).—Central southern Texas south into Tamaulipas, Mexico.

Red-bellied hawk (*Buteo l. elegans*).—Resident in Austral Zones of California, chiefly in the San Joaquin and Sacramento Valleys and lowlands of the San Diego district, from Marin and Shasta Counties south to northwestern Baja California.

RECOGNITION

More slender than the redtail, bright ruddy shoulders and often upper breast, the breast streaked, not pale as in the redtail; in flight, a pale, apparently translucent spot beyond the wrist mark on under-surface of wings; tail with crossbars. Length, 18 to 24 inches; spread, 32 to 50 (figs. 1, *I* and *K*; and 6).

CONTENTS OF STOMACHS

Poultry and game birds apparently are not very frequently taken by the red-shouldered hawk, the records for the 391 birds examined standing respectively at 8 for chickens, 4 for pheasants, and 1 each for the quail, mourning dove, sora rail, and woodcock. The following birds of unusual interest were each identified in a single stomach: Crow, sparrow hawk, and screech owl, and 28 stomachs contained birds of a variety of smaller species. The sparrow family furnished most of the victims, with the blackbird and meadow lark group next in order. One of the very smallest birds, the winter wren, was identified in 1 stomach.

Among the larger mammals identified among the prey of the 391 birds were rabbits in 4 stomachs; squirrels, including red squirrels and chipmunks, in 9; and an opossum, a skunk, and a muskrat in 1 each. Moles were identified in 8 stomachs, and shrews in 41, a number of the stomachs containing 2 to 4 shrews each. As usual with the soaring hawks, mice are the most important element of the food. Meadow mice were identified in 82 of the stomachs examined, and other species, including the house mouse and the white-footed mouse, in 59; often 4 to 5 meadow mice were found in a stomach, and in one case no fewer than 9 house mice were so disclosed. The rice rat was found in 4 stomachs and the house rat in 1.

The red-shouldered hawk is generally acknowledged to have a strong taste for amphibians and reptiles, and this reputation is substantiated by the stomach examinations here reported upon. Remains of frogs occurred in 59 stomachs and toads in 19; frogs in numbers up to 4 were found in single stomachs, and in a few cases the largest species, the bullfrog, was discovered. Unidentified adults of this group were taken from 2 stomachs and a tadpole from 1. Salamanders, tailed representatives of the same class, were found in the stomachs of 7 of the birds.

Lizards, including skinks, the legless lizard or "glass snake", and chameleons were eaten by 24 of the red-shouldered hawks. Snakes, among them the blue racer and whip, garter, ringneck, green, water, and chain snakes, were found in 54 stomachs (about 1 in 7), and turtles in 4. Fishes were identified in the food of 5 of the birds, and carrion in 3.

The favorite insect food of the red-shouldered hawk seems to be grasshoppers. These were identified in 94 stomachs, and crickets in



B2192M

FIGURE 6.—Red-shouldered hawk.

49. Grasshoppers were found in numbers as high as 46 in a single stomach; and 10 of the largest flying grasshopper, the bird locust, had been eaten at a meal by one of these hawks. Similar figures for ordinary crickets are 31 as a maximum and 4 for the destructive subterranean mole cricket.

Caterpillars are rather frequently eaten, as evidenced by their presence in 20 stomachs; the large sphinx larvae are favored, and no fewer than 22 of these were taken from a single stomach. Other insects, including representatives of such economically important forms

as the potato beetle, squash bug, cutworms, wireworms, and white grubs, were found in 105 stomachs. Among miscellaneous animal remains were those of spiders in 30 stomachs, crawfishes in 26 (as many as 5 in a stomach), and centipedes, earthworms, and snails in 1 each.

STATUS

The red-shouldered hawk appears far less destructive to poultry and game than the redtail, and is not a pronounced bird eater. It takes some mammals that are of economic value, but far more that are injurious. It has a pronounced taste for amphibians and reptiles and probably does more harm than good in consuming these creatures. On the other hand, its rather extensive destruction of insects is chiefly to the good. On the whole the bird is more beneficial than injurious.

BROAD-WINGED HAWK

The broad-winged hawk (*Buteo platypterus*) breeds from central Alberta, central Saskatchewan, southern Manitoba, Ontario, central Quebec, New Brunswick, and Cape Breton Island south to the Gulf coast and central Texas, mainly east of the Mississippi. Winters from southern Florida and southern Mexico through Central America to Colombia, Venezuela, and Peru; rarely farther north (reported from Connecticut, New Jersey, West Virginia, Ohio, Indiana, and Illinois).

RECOGNITION

Much smaller than either the red-tailed or the red-shouldered hawk, about the size of the crow or of a large Cooper's hawk; the short, broad, square-angled tail with few heavy crossbars (3 black, 2 white, as seen from below) distinguishes the broad-winged hawk from that species, and this tail coloration is distinctive also among its congeners; wings appearing chiefly white below, with dark tips, breast brown. Length, 13 to 19 inches; spread, 32 to 39 (figs. 1, L; and 7).

CONTENTS OF STOMACHS

The great cry against hawks that they kill chickens finds no basis to date in stomach analyses so far as the broad-winged hawk is concerned, no remains of poultry whatever being found in the 145 examined. Only 1 game bird, a ruffed grouse, was disclosed, and 13 other, mostly small birds.

Rabbits also seem rather large prey for this hawk, only 2 of them occurring in the 145 stomachs. Squirrels were discovered in 2, chipmunks in 5, and a weasel, a mole, and a bat in 1 each. The most frequently captured mammals were shrews, found in 24 stomachs, the largest number in any one being 4. Pine and meadow mice had been taken by 14 of the birds, other mice by 10, and a house rat by 1.

Snakes are a rather staple food of the broad-winged hawk, occurring in 31 stomachs, or more than a fifth of the total number examined. Among the kinds of serpents eaten are the blue racer, garter, green, red-bellied, and brown snakes. Lizards were found in 8 of the stomachs and a turtle in 1.

Frogs and toads are favorite food items also, the former being taken by 25 and the latter by 16 of the 145 hawks. Remains of no

fewer than 6 toads were recovered from a single stomach. Salamanders had been consumed by 4 of these hawks.

Insects are important as food for the broad-winged hawk and among them grasshoppers and their allies lead. Grasshoppers occurred in 33 stomachs, the maximum in a single stomach being 41; the katydid group was well represented. Crickets, including the destructive mole cricket, were found in 19 stomachs, the maximum in any one being 8. As many as 8 cicadas were taken at a meal. Cater-



FIGURE 7.—Broad-winged hawk.

B2194M

pillars were freely devoured, among them the hickory-horned devil, sphinx caterpillars, and cutworms, the maximum single take was 32. Other insects economically of ill repute that are eaten by this hawk include rather frequently the brown June beetles and their larvae the white grubs, and (with fewer records) the green June beetle, click beetles the parents of wireworms, and giant water bugs and beetles. Insects of groups other than the grasshopper allies and caterpillars occurred in 60 of the 145 stomachs.

Spiders were taken by 7 of these hawks, centipedes by 2, crawfishes by 5, and earthworms by 1.

STATUS

The broad-winged hawk is not much of a bird eater, and little harm can be charged to it in that respect. It gets enough of the insectivorous shrews, however, to modify materially the import of its predation upon injurious mammals, the final balance between good and harm being about even. In consuming reptiles and amphibians,



FIGURE 8.—Swainson's hawk.

B2193M

which it does freely, the broad-winged is moderately injurious, while in insect destruction, a considerable share of its activities, it is chiefly useful. This hawk does almost no direct damage to man, and the indirect effect of its activities is in its favor.

SWAINSON'S HAWK

Swainson's hawk (*Buteo swainsoni*) breeds from interior British Columbia, Fort Yukon, Great Slave Lake, and Manitoba south to northern Mexico. Winters in southern South America, only occasionally north of the Equator. Casual in Quebec, Ontario, Michigan, Vermont, New York, Maine, Massachusetts, and Florida.

RECOGNITION

A large mouse hawk, usually with a broad dark band across upper breast. Length, 18 to 22 inches; spread, 47 to 57 (figs. 1, *M*; and 8).

CONTENTS OF STOMACHS

It is evident that this species is by no means a "bird hawk" as only 1 grouse and 9 small birds were found in 111 stomachs.

Western ground squirrels, or spermophiles, are the principal food of this hawk. They occurred in 62, or well over half, of the stomachs. Pocket gophers, also characteristic mammal pests of the West, were found in 5 stomachs, meadow mice in 6, other mice in 2, rabbits in 3, and kangaroo rats and shrews in 1 each. The destruction of mammals by Swainson's hawk, therefore, is practically all to the good. The following were the maximum numbers of some of the rodents represented in a single stomach: Ground squirrel, 4; meadow mouse, 5; and pocket gopher, 6.

This hawk occasionally preys on snakes (found in 9 stomachs), lizards (in 5), and toads (in 5), and samples related animals, as turtles (in 1), and frogs (in 1). The turtle eaten was a snapper; among the lizards was a horned toad; and the snakes included the hog-nosed snake or spreading adder, garter snake, Pacific bull snake, and striped racer.

Grasshoppers and crickets are this hawk's chief insect food. The former were found in 24 stomachs, a maximum of 200 for a single meal; and the latter in 18 stomachs, as many as 109 in 1 stomach. The Mormon cricket, a sporadically destructive species, occurred in 8 stomachs, the greatest number taken by a single bird being 35. Caterpillars had been eaten by 8 of the birds, other insects (including beetles and dragonflies) by 17, spiders by 3, and centipedes by 1.

STATUS

Swainson's hawk, eminently a destroyer of ground squirrels and pocket gophers, and of grasshoppers and crickets, thoroughly deserves considerate treatment at the hands of man.

AMERICAN ROUGH-LEGGED HAWK

The American rough-legged hawk (*Buteo lagopus s. johannis*) breeds chiefly in the Hudsonian Zone from the Aleutian Islands, northwestern Alaska (Arctic coast), Victoria Island, southwestern Baffin Island, northern Quebec (Un-gava), and northeastern Labrador to northern Alberta, north shore of the Gulf of St. Lawrence, and Newfoundland. Winters from southern British Columbia, Colorado, Minnesota, the northern boundary of the United States, and southern Ontario south to southern California, southern New Mexico, Texas, Louisiana, and North Carolina.

RECOGNITION

One of the largest of the mouse hawks, with base of tail white (not a white rump as in the marsh hawk), and white showing above at the base of the primary wing feathers in flight; a large dark wrist mark on the underside of the wing; legs feathered to the toes. Immature birds have a broad blackish belt across the abdomen; and there is a dark phase that appears almost entirely black, with the under surface of the wings chiefly white. Length, 19 to 23 inches; spread, 48 to 56 (figs. 1, *N*; and 9).

CONTENTS OF STOMACHS

One pied-billed grebe, 1 ruddy duck, and 2 smaller birds were identified in the 99 stomachs examined, but it seems probable that the first two mentioned were crippled or dead when found by the hawk.

Mice are the staff of life for the roughleg, meadow and pine mice being found in 51 stomachs, house mice in 5, and others (including



B2195M

FIGURE 9.—American rough-legged hawk.

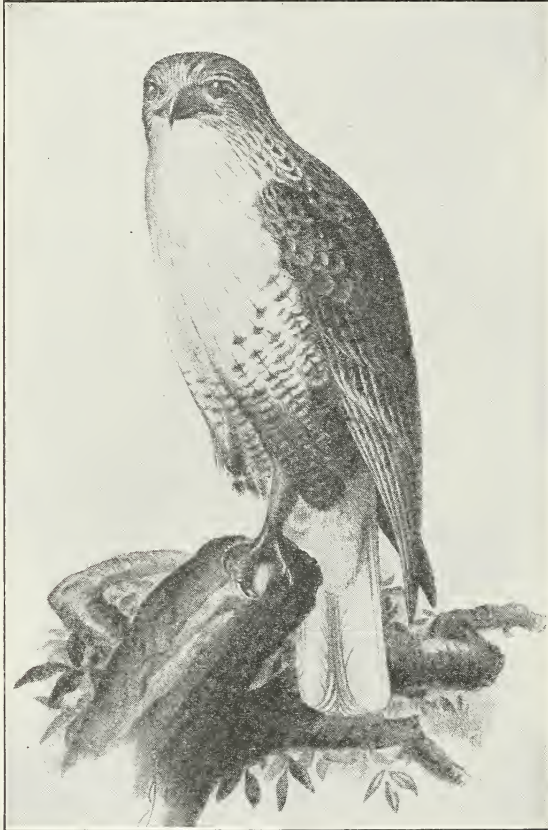
deer mice and lemmings) in 22; the largest number of lemmings in 1 stomach was 4; of house mice 5, of meadow mice, 8, and of a closely allied desert mouse 15. Three brown rats were identified in 1 of the 2 stomachs containing remains of these animals. Other chiefly vegetarian mammals consumed by the rough-legged hawks studied were rabbits in 9 stomachs, ground squirrels (spermophiles) in 5, pocket gophers in 3, and a prairie dog in 1. Carnivorous mammals eaten included a weasel in 1 stomach, shrews in 11, and a mole in 1.

The rough-legged hawk seems not to vary its vertebrate diet so much as do some of its congeners—traces of lizard, toad, and fish having been found in only a single stomach each.

Among invertebrates, grasshoppers occurred in only 3 stomachs, other insects (one a bumble bee) in 4, caterpillars in 1, and crawfish in 1.

STATUS

The roughleg subsists largely on rodents, most of which are more or less injurious, and the bird accordingly deserves strict protection.



E219CM

FIGURE 10.—Ferruginous roughleg.

FERRUGINOUS ROUGHLEG

The ferruginous roughleg (*Buteo regalis*) breeds from extreme southern Alberta and Manitoba to northeastern California, eastern Oregon, Utah, southern Arizona, New Mexico, and Kansas. Winters from California and Montana to Baja California and northern Mexico. Casual east to Wisconsin and Illinois.

RECOGNITION

Shows white above at base of primary feathers of wing in flight, and legs are feathered to the toes, as in the American roughleg; tail chiefly white, lacking the dusky terminal band present in the ordi-

nary phase of the American roughleg; the dark markings seen from below are restricted to the flanks, not forming a band across the abdomen. Length, 22 to 24 inches; spread, 54 to 56 (fig. 10).

CONTENTS OF STOMACHS

Only two birds were found in the 17 stomachs examined, and those of widely different sizes—a sharp-tailed grouse and a western Savannah sparrow.



B91M

FIGURE 11.—Golden eagle.

The data from the rather meager series of stomachs indicate rabbits to be the chief food of the ferruginous roughleg; they were found in 8 stomachs. Spermophiles were identified in 4, meadow mice in 3, and other mice in 1. In two instances 5 meadow mice were counted in individual stomachs.

Only one insect was determined in any of the 17 stomachs, and that was a large Jerusalem cricket.

STATUS

Even though the quantity of material available for study is small, it indicates that the ferruginous roughleg, like the American roughleg, is chiefly beneficial.

GOLDEN EAGLE

The golden eagle (*Aquila chrysaetos canadensis*) breeds in mountainous regions from northern Alaska, northwestern Mackenzie, and perhaps casually in the Canadian Provinces east of the Rocky Mountains south to northern Baja California, central Mexico, western Texas, Oklahoma, and formerly to North Carolina. Probably no longer breeds in the United States east of the Mississippi, except possibly in North Carolina and eastern Tennessee. In winter, south casually to Louisiana, Alabama, northern Florida, and southern Texas.

RECOGNITION

Yellowish or golden brown on back of head, legs feathered to the toes; otherwise difficult to distinguish from the juvenile bald eagle; immature with a white patch showing below at wrist of wings, and tip of tail with a darker band. Length, 30 to 41 inches; spread, 75 to 92 (figs. 1, *O*; and 11).

CONTENTS OF STOMACHS

Rabbits were the leading article of food occurring in 14 of the 26 stomachs. No other single item except carrion was found in more than 2 stomachs. Carrion had been fed upon by 3 of the birds, and the following animals by 2 each: Gray squirrels, woodchucks, and pintail ducks. The following items were taken in each case by only 1 bird: Spermophile, chicken, and a varied thrush.

STATUS

The showing made by the 26 golden eagles studied is not very unfavorable. The golden eagle, however, can take about what it wishes from among the medium to small animals. Where it feeds mainly on rabbits there is no cause for complaint, but it can readily be seen that the activities of the bird may at times have to be curbed.

BALD EAGLE

Northern bald eagle (*Haliaeetus leucocephalus alascanus*).—Ranges in boreal zones of northwestern Alaska, northern Mackenzie, and northern Quebec (Ungava) south to British Columbia and the Great Lakes. Winters south at least to Washington, Montana, and Connecticut.

Southern bald eagle (*Haliaeetus l. leucocephalus*).—United States to southern Baja California and central Mexico, breeding in suitable localities throughout its range; rare and local in California (except on the Santa Barbara Islands) and in the arid interior States.

RECOGNITION

In adult large dark birds, the white head, neck, and tail are unmistakable; the young sometimes have pale, blotched plumage, but otherwise may be difficult to distinguish from young golden eagles. There is no dark band at tip of tail, no distinct white patches on wing below, and the feathering of the legs does not extend lower than an inch or more above the base of the toes. Length, 30 to 43 inches; spread, 72 to 98 (figs. 1, *P* and *Q*; and 12).

CONTENTS OF STOMACHS

Fish remains were predominant, occurring in 29 of the 58 stomachs. The fishes identified belonged to such groups as salmon, cod, sun-fishes, perch, suckers, flounders, eels, and sculpins. The very names of these in themselves suggest that most of them were obtained as carrion, for in no other form would an eagle be likely to get such marine fishes as cod, sculpin, and flounder. Even the salmon, the



B95M

FIGURE 12.—Bald eagle.

destruction of sound individuals of which has been charged against the bald eagle, was in some of these instances obviously carrion. Further evidence of the beachcombing activity of this eagle is the presence of crabs, marine worms, and sea slugs in the stomachs.

Waterfowl remains, identified in 6 stomachs, included 1 Bonaparte's gull and ducks, among the latter 1 American goldeneye and 1 surf scoter. Domestic fowl occurred in 1 stomach.

The bald eagle forages in the upland to some extent, a habit attested to in the present findings by two captures of rabbits, and one each of prairie dog, rat, and mouse. Food considered carrion, besides the fish previously referred to, was found in 14 stomachs; in fact the bald eagle's propensity for carrion eating is so strong that the question arises in the case of almost everything found in the stomach of this bird as to whether it may not have been taken as carrion.

STATUS

A vulture in the guise of a hawk, so far as food habits indicate, the bald eagle ordinarily is to be tolerated, but sometimes may be destructive to wild fowl or valuable fishes and then may deserve local control.

MARSH HAWK

The marsh hawk (*Circus hudsonius*) breeds from northwestern Alaska, northwestern Mackenzie, northern Manitoba, northern Ontario, central Quebec, and Newfoundland south to northern Baja California, southern Arizona, southern Texas, southern Illinois, southern Indiana, Ohio, Maryland, and southeastern Virginia. Winters from southern British Columbia, western Montana, western South Dakota, the southern parts of Wisconsin, Michigan, New York, Vermont, and New Hampshire south to the Bahamas, Florida, Cuba, and Colombia.

RECOGNITION

Larger than the crow, wings and tail long, the rump always white; flight gull-like, and at a distance the light-gray old males look much like gulls. Length, 17 to 24 inches; spread, 40 to 54 (figs. 1, *D*; and 13).

CONTENTS OF STOMACHS

Among birds used as food by man, remains of poultry were found in 20 of the 601 stomachs of marsh hawks examined. Upland game birds had been taken in the following number of instances: European partridge, 1; sharp-tailed grouse, 1; valley quail, 1; heath hen, 3 (in stomachs collected more than 20 years ago); ruffed grouse, 4; bobwhite, 4; and pheasants, 37. The large number of pheasants is due to the collection of an unusual proportion of the stomachs at a game farm located in a main path of migration of the hawks. Remains of ducks, in two instances those of pintails, were identified in 4 stomachs, rails in 4, jacksnipe in 5, and woodcock in 1. Other shore birds no longer on the game list were determined in a number of stomachs, the smaller sandpipers being the most numerous victims.

Miscellaneous birds of small to medium size had been taken by 265 of the 601 marsh hawks studied. The avian prey most frequently taken was of the sparrow family. Remains of song sparrows and their allies (*Melospiza*) were found in 62 stomachs, chewinks in 27, chipping sparrows and congeners (*Spizella*) in 26, and sharp-tailed sparrows in 26. Meadow larks in 12 stomachs and bobolinks in 9 are representatives of the group next in rank; and robins (in 18) of the next. Large or otherwise especially interesting prey of these hawks included a short-eared owl, in 1 stomach; screech owls, in 4; and hawks, in 5—among which sharp-shinned, pigeon, and sparrow hawks were identified—and a least bittern, a nighthawk, and a whippoorwill, each found in a single stomach.

Among mammals, one of the food stand-bys of the marsh hawk is rabbit, with 62 records. Mice, however, were the most frequent captures, meadow mice (up to 5 at a meal in some cases) being found in 173 stomachs, house mice in 5, and other mice (including deer and jumping mice) in 33. House rats were identified in 12 stomachs, cotton rats in 4, and wood rats in 2. Spermophiles and pocket gophers, well-known rodent pests of the West, were found in 19 and 2 stomachs, respectively, and the following other mam-



B34M

FIGURE 13.—Marsh hawk.

mals in the number of instances noted: Squirrels, 6; shrews, 12; muskrats, 2; and skunk, 1.

The marsh hawk appears to take snakes when opportunity offers, 13 of the birds here reported upon having done so. The snakes captured included blue racers and garter snakes. Frog remains were identified in 15 of the stomachs and those of a fish and a crawfish in 1 each.

Grasshoppers were eaten by 15 of the hawks, and other insects (including crickets and dragonflies) by 24.

STATUS

Probably the insect food of the marsh hawk may be balanced against that portion composed of the moderately beneficial snakes and frogs. The remainder of its subsistence is about equally divided between birds and mammals, the indication being that more harm than good is done in the destruction of the former and that the reverse is true in the case of the latter. The economic tendencies of the marsh hawk seem to be about evenly balanced, and the decision as to whether it should be interfered with should be based on local experience—but this should be actual experience or observation, not prejudice.

OSPREY

The osprey (*Pandion haliaëtus carolinensis*) breeds from northwestern Alaska, northwestern Mackenzie, Churchill, Hudson Bay, northern Manitoba, central Quebec, southern Labrador, and Newfoundland south to Baja California, western Mexico, the Gulf States, and the Florida Keys. Winters from Florida and the Gulf States through Baja California and Mexico to the West Indies and Central America.

RECOGNITION

Dark brown above, a black stripe behind the eye; top of head but not neck white; mostly white below, with long, bent wings on which it flaps slowly, or sometimes poises or soars; heavy black wrist mark at the forward angulation of wing; plunges in water for its food. Length, 21 to 25 inches; spread, 54 to 72 (figs. 1, V; and 14).

CONTENTS OF STOMACHS

Apparently fishes made up the whole prey of the 33 ospreys examined. Of the fresh-water fishes taken, suckers were found in 10 stomachs, yellow perch in 5, goldfish in 2, and sunfish, strawberry bass, and catfish each in 1. Saltwater fishes taken were menhaden in 5 stomachs, and tomcod, flatfish, and a member of the trigger-fish group each in 1. Fish remains further unidentified were present in 11 stomachs of this fish hawk.

STATUS

The osprey, like other fish-eating birds, subsists principally upon the most common and easily captured fishes, and as a rule these are not important commercial or game species.

PRAIRIE FALCON

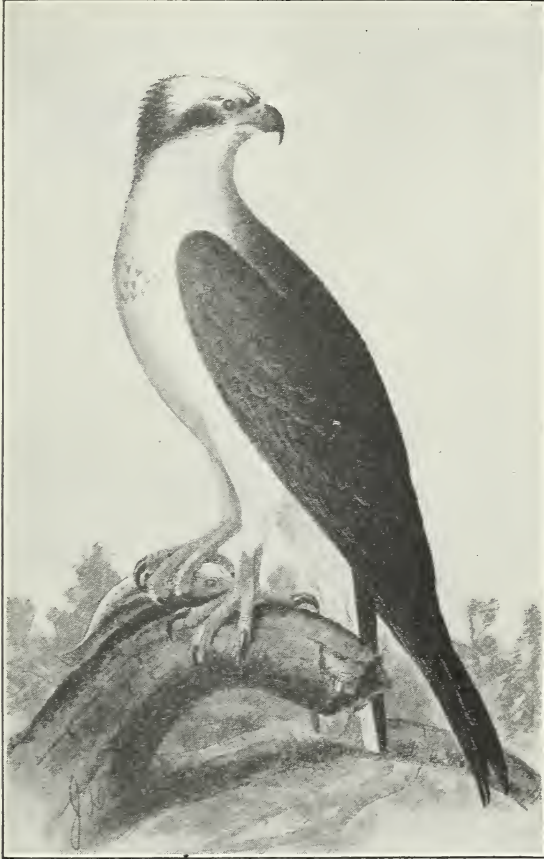
The prairie falcon (*Falco mexicanus*) ranges in Transition and Austral Zones, from the eastern border of the Great Plains and from southern British Columbia, southern Alberta, and southeastern Saskatchewan to southern Baja California and southern Mexico. Casual east to Manitoba, Minnesota, and Illinois.

RECOGNITION

Upper parts pale brownish, under parts not barred; "moustache" inconspicuous. Length, 16 to 20 inches; spread, 37 to 40.

CONTENTS OF STOMACHS

Of the 15 stomachs available for study, 7 contained bird remains only, and 5 mammals only, 1 both these types of food, 1 a bird and insects, and 1 a mammal and insects. The birds identified were, in the order of size, the hooded merganser, prairie chicken, Gambel's quail (in 2 stomachs), a pigeon, mourning dove, crissal thrasher, horned larks (in 2 stomachs), and a Savannah sparrow. The mam-



E2199M

FIGURE 14.—Osprey.

mals were spermophiles in 4 stomachs, a prairie dog, meadow mice (4 individuals), and a deer mouse each in 1. The insects eaten were all grasshoppers, in one instance as many as 16.

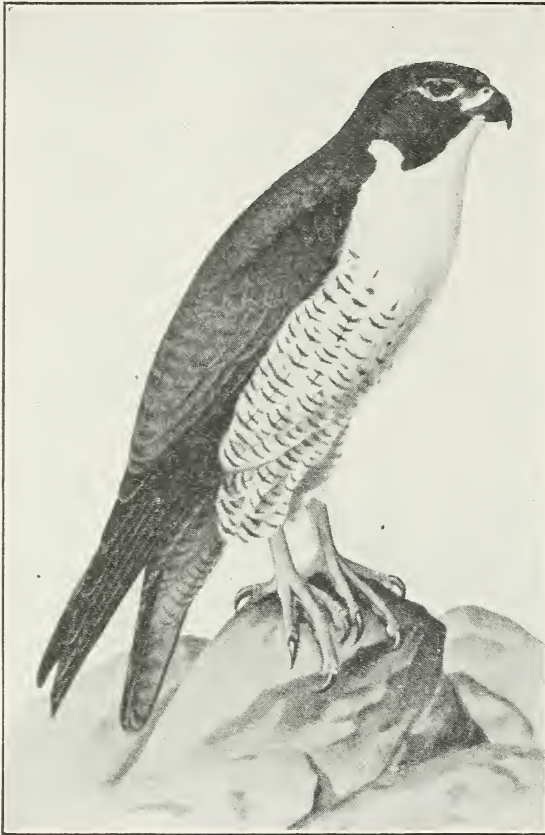
STATUS

In taking mammal food the prairie falcon does more good than harm, and in preying upon birds the opposite. Since it is inclined to favor birds, the balance is slightly against it, and it should be regarded as a species subject to local control when necessary.

DUCK HAWK

Peregrine Falcon (*Falco peregrinus peregrinus*).—Casual in Greenland.

Duck hawk (*Falco p. anatum*).—Breeds locally from Norton Sound, Alaska, northern Mackenzie, Boothia Peninsula, Baffin Island, and the west coast of central Greenland south to central Baja California, central Mexico, Arizona, central western Texas, Kansas, Missouri, Indiana, Pennsylvania, and Connecticut, and in the mountains to Tennessee. Winters from Vancouver Island through California, and from Colorado, southeastern Nebraska, southern Illinois, Indiana, Pennsylvania, New Jersey, New York (Long Island), and Massachusetts to the West Indies and Panama.



B213M

FIGURE 15.—Duck hawk.

Peale's Falcon (*Falco p. pealei*).—Breeds on the Queen Charlotte (?), Aleutian, and Commander Islands. Transient in the Sitka district, Alaska. South in winter to Oregon.

RECOGNITION

The black cap and heavy "moustache" are characteristic of adult duck hawks at close view; upper parts blackish or bluish, under parts somewhat barred. Length, 15 to 20 inches; spread 38 to 46 (figs. 1, S; and 15).

CONTENTS OF STOMACHS

Of the 57 duck-hawk stomachs here reported upon, 53 contained birds. Justifying the name "duck hawk" were remains of pintails in 2 stomachs, of a cinnamon teal in 1, and of other ducks in 6. Chickens were taken by 3, a Gambel's quail by 1, and mourning doves by 2. Shore birds, however, are the group most commonly preyed upon by duck hawks, those identified in the stomachs being the killdeer, snowy plover, upland plover, solitary and least sandpipers, yellowlegs, avocet, and northern phalarope. The sparrows, small as most of them are, were next in rank as duck-hawk food. One of the larger and most frequently taken members of this family, the rose-breasted grosbeak, was found in 4 stomachs, and a redpoll and the lark, Savannah, song, and chipping sparrows were also identified. A variety of other birds, representing 13 families, were determined, mostly in a single stomach each, but meadow-lark remains occurred in 7 and those of flickers in 5. The duck hawk can take almost any bird it pleases, and remains of the black tern and of nighthawks in some of the stomachs attest its powers of flight.

The stomachs that did not contain birds revealed the following: Mice in 1, ground beetles and long-horned wood borers in 1, grasshoppers and crickets in 1, and a moth in 1. Dragonflies occurred in 3 stomachs along with other items of food.

STATUS

As a confirmed bird eater, the duck hawk does more harm than good. It is rare and local, however, and a most interesting species that can well be spared except in localities where it does too great damage to poultry and other valuable birds.

PIGEON HAWK

Eastern Pigeon Hawk (*Falco columbarius columbarius*).—Breeds from the limit of trees in eastern Canada south to Newfoundland, Nova Scotia, New Brunswick, northern Maine, Ontario, northern Michigan, and southern Manitoba west to the eastern border of the Great Plains. Winters from the Gulf States south through eastern Mexico to Ecuador and northern Venezuela, and in the West Indies.

Black Pigeon Hawk (*Falco c. suckleyi*).—Breeds apparently in western British Columbia and perhaps on Vancouver Island. Winters in the coast region of British Columbia, rarely south to northern California.

Richardson's Pigeon Hawk (*Falco c. richardsoni*).—Breeds in the Great Plains region from southern Alberta and southern Saskatchewan to northern Montana and northwestern North Dakota. Winters south through Colorado, New Mexico, and western Texas to northwestern Mexico.

Western Pigeon Hawk (*Falco c. bendirei*).—Breeds from northwestern Alaska, Yukon, and northwestern Mackenzie to British Columbia, northern and western Alberta, northern Saskatchewan, and south in the mountains to northern California. Winters south through California and New Mexico to the cape region of Baja California and northeastern Mexico. Casual in Louisiana, Florida, North Carolina, and South Carolina.

RECOGNITION

Size of the sparrow hawk, but coloration entirely different; dark brownish or bluish above without any reddish brown; the falcon

wings and the flight set it apart from similar-sized hawks of the blue-darker group. Length, 10 to 13 inches; spread, 23 to 26 (figs. 1, *T*; and 16).

The pigeon hawk is primarily a bird hawk; 280 of the 727 stomachs here reported on contained bird remains only, while an additional 282 contained birds and insects. In 130 there were insects only, while in others were revealed varying combinations of prey. The total containing birds was 569; and that for insects, 430.



FIGURE 16.—Pigeon hawk.

E2157M

CONTENTS OF STOMACHS

Of the birds consumed, remains of a chicken were found in only one stomach; the same is to be said for a pigeon, the only other kind of poultry revealed, and for mourning dove and woodcock, the only game birds represented. It is worth noting that these are also the largest kinds of prey identified in the stomachs.

Warblers head the list of the smaller birds captured by pigeon hawks, the common genus *Dendroica* being represented by 119 identi-

fications; warblers further unidentified were found in 19 stomachs, water thrushes and ovenbirds (*Seiurus*) in 9, *Wilsonia* in 9, yellowthroats (*Geothlypis*) in 6, and others in fewer cases.

The prevalent sparrow group stands next in number of captures; forms not further identified were taken by 17 of the birds, members of the song-sparrow group (*Melospiza*) by 73, members of the chipping- and tree-sparrow genus (*Spizella*) by 38, English sparrows by 29, purple finches by 13, juncos by 8, and others by smaller numbers.

Thrushes fell victim to 55 of these 727 pigeon hawks, robins to 19, and bluebirds to 6. The expertly flying swallows and swifts did not escape, as chimney swifts were identified in 13 of the stomachs, tree swallows in 14, barn swallows in 15, and in lesser numbers representatives of all the other groups of swallows, none being lacking. Cedar waxwings were identified in 28 of the stomachs, remains of red-breasted nuthatches in 28, and of vireos in 40. Members of 14 additional families of birds were identified, none of them, however, in as many as 10 stomachs. Among the largest species of these were a meadow lark and a flicker—a single instance of each—and among the smallest a blue-gray gnatcatcher and a ruby-crowned kinglet, each of which was found in but 1 stomach.

The insects most frequently captured by the pigeon hawks were dragonflies, which occurred in 389 stomachs. Fifty stomachs yielded remains of 10 or more dragonflies each, and the highest count was 34. Butterflies were next, with 68 records, crickets with 40, and grasshoppers with 32, the largest number of specimens of any one of these 3 groups in a single stomach being 28, 25, and 33, respectively. Smaller numbers of a variety of other fairly large insects were taken, including a mole cricket, green grasshoppers allied to katydids, moths, caterpillars, cicadas, June beetles, and other large leaf chafers, long-horned wood borers, and giant water bugs.

The hawks may have come to ground for some of the kinds of prey previously listed, and they must have for some of the items yet to be mentioned; for example, a scorpion, crawfishes in 3 stomachs, some large spiders in 2, toads in 3, garter snakes in 4, and small mammals other than bats. Bats were identified in 7 stomachs, meadow mice in 5, shrews in 3, deer mice in 2, and a house mouse, a red-backed mouse, and a spermophile in 1 stomach each.

STATUS

Birds are the first dietary preference of the pigeon hawk, and beneficial kinds predominate in its food. In making dragonflies the chief item of its insect food, this hawk does nothing to balance accounts, but choice of most of the remainder of its food is chiefly such as would be desired.

SPARROW HAWK

Eastern sparrow hawk (*Falco sparverius sparverius*).—Breeds from the Upper Yukon, British Columbia, northwestern Mackenzie, Alberta, Saskatchewan, Manitoba, northern Ontario, southern Quebec, and Newfoundland, south to northwestern California, western Oregon, Colorado, eastern Texas, and the eastern Gulf States (except the southern border and Florida). Winters from southern British Columbia, Kansas, Indiana, central Illinois, Ohio, southern Ontario, southern Michigan, southern Vermont, and Massachusetts south through eastern Mexico to Panama.

Desert sparrow hawk (*Falco s. phalaena*).—Breeds from southern New Mexico, Arizona, southern California, and southern Nevada south into Mexico and northern Baja California. Winters south to Guatemala.

San Lucas sparrow hawk (*Falco s. peninsularis*).—Southern Baja California.

Little sparrow hawk (*Falco s. paulus*).—Florida Peninsula and the southern portion of the Gulf States north to central Alabama.

RECOGNITION

Back reddish brown, barred with black; head looks big and round; cheeks white, with two vertical black bars; frequently hovers, and cries most commonly *killy-killy-killy*; pumps its tail upon alighting. Length, 9 to 12 inches; spread, 20 to 24 (figs. 1, *U*; and 17).



B2158M

FIGURE 17.—Sparrow hawk.

CONTENTS OF STOMACHS

Grasshoppers and their allies, the chief source of food of the sparrow hawk, were found in 491 of the 703 stomachs here reported upon, or in about 5 out of 7. Grasshoppers of the ordinary type (brown grasshoppers, or locusts) were identified in 395 stomachs, crickets in 248, green grasshoppers and their allies in 137, and mantids in 6. Records of 20 or more individuals of the first three groups being taken at a meal are frequent, and remains of no fewer than 47 green grasshoppers, 55 brown grasshoppers, and 61 crickets

were detected in single stomachs; one bird had taken 47, 15, and 16 individuals of these groups, respectively.

Beetles had been consumed by 207 of the sparrow hawks, most of the beetles being the larger forms, as tiger beetles, ground beetles, carrion beetles, long-horned wood borers, tumble bugs, and leaf chafers. The larvae of beetles, including white grubs, also were rather freely taken. Caterpillars were identified in 150 stomachs, in one case as many as 124; moths in 19 stomachs, and butterflies in 3. Dragonflies had been taken by 42 of the birds, and cicadas and their nymphs by 16. Various other insects were also captured, and in addition other invertebrates, as spiders by 153 of the hawks, centipedes by 7, scorpions by 3, and an earthworm by 1.

Mammals clearly take the lead among the vertebrate prey, having been found in 192 stomachs. Meadow mice, the predominant item, were identified in the prey of 82 of the birds. White-footed mice, with 36 identifications were next, and the following mammals also were taken by the number of hawks indicated: House mice, 23; pocket mice, 3; spermophiles, 6; chipmunks, 3; rabbit, cotton rat, wood rat, pocket gopher, and red-backed mouse, by 1 each; shrews, by 14; and a bat, by 1.

The birds most frequently captured were members of the sparrow tribe, in 13 instances song sparrows and their allies (*Melospiza*) and, also in 13 instances, chipping sparrows and their allies (*Spizella*). Warblers had been captured by 5 of the birds, meadow larks by 3, and a ground dove and a quail by 1 each. These last three groups constituted the largest birds taken, while at the other end of the scale were such small birds as the winter wren and the bushtit.

Lizards in 41 of the stomachs included most of the common kinds, swifts (*Sceloporus*) and chameleons (*Anolis*) leading, in 14 and 11 instances, respectively; horned toads (*Phrynosoma*) had been taken by 5 of the birds. The snakes in 21 stomachs were chiefly garter snakes, identified in 10 of the stomachs; the little *Storeria* was found in 6; green snakes, blue racers, and a ground snake were also found. Frogs were taken by 4 of the birds, and a toad by 1.

STATUS

Misnamed, the sparrow hawk could much more appropriately be called the grasshopper hawk. Grasshoppers and their allies are its main food, and in devouring them little but good is done. The beetles eaten represent in part an economic loss, as is the case also with the spiders and certain minor items in the food; in general, however, the effect of this hawk's eating of invertebrates is praiseworthy. The same is true of its mammal food. Birds are not extensively eaten by the sparrow hawk, and its depredations on the moderately beneficial lizards and snakes are not great enough to offset its good record against grasshoppers. Despite some lapses, the sparrow hawk eminently deserves strict protection.

CONCLUSIONS

Consideration of the evidence available in the Bureau of Biological Survey from the analyses of 5,185 stomachs of the more common

hawks leads to a rather complex grouping of these birds as regards their economic tendencies. Judged as are other birds on the basis of the direct or indirect utility to man of the prey they consume, it appears that the species differ greatly in the harm and good they do. Moreover, the element of locality, controlling the character of food available, is important in determining their status. The results of specific group studies, therefore, rather than general conclusions regarding hawks, are needed. In the opinion of the writer, based strictly on the data presented in this circular, the economic grouping shown in table 1 is justified, though the addition of considerable numbers of stomachs and other material, particularly from certain regions not now represented, might greatly change the nature of the results and make alterations in this classification necessary. In this table the various species are listed in the order of their economic value, the gradations being from species almost entirely injurious to those wholly beneficial.

TABLE 1.—*Economic status of common hawks, based on data obtained from a study of 5,185 stomachs in the Bureau of Biological Survey*

| Species | Stomachs examined | Economic status indicated |
|----------------------------------|-------------------|---|
| | <i>Number</i> | |
| Goshawk | 243 | } Species of which little that is favorable can be said. |
| Sharp-shinned hawk | 944 | |
| Cooper's hawk | 261 | |
| Duck hawk | 57 | } May be tolerated in small numbers; not in abundance. |
| Pigeon hawk | 727 | |
| Bald eagle | 58 | } Ordinarily neutral; sometimes injurious. |
| Osprey | 33 | |
| Marsh hawk | 601 | } Neutral; harmful and beneficial habits in about equal proportion. |
| Prairie falcon | 15 | |
| Red-tailed hawk | 754 | } More beneficial than injurious; at times subject to control. |
| Golden eagle | 26 | |
| Red-shouldered hawk | 391 | } Preponderantly beneficial; seldom in need of control. |
| Broad-winged hawk | 145 | |
| Ferruginous roughleg | 17 | |
| Swainson's hawk | 111 | } Almost entirely beneficial. |
| American rough-legged hawk | 99 | |
| Sparrow hawk | 703 | |

The facts developed by analysis of the stomach contents of hawks carry conviction attached to no other form of evidence as to the food habits of these birds, and hence as to their economic status. It is hoped that readers will give the facts here presented the weight to which they are entitled. They indicate a variety of feeding habits of the hawks—which include also the eagles and the falcons—almost as diverse as the species concerned. In other ways they emphasize the complexity of a problem that man should not attempt to solve in an off-hand manner. A rule to be borne in mind, even when hawk control is found necessary, is that aggressive action should be directed against the offending individuals only, not against the entire race.

**ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE
WHEN THIS PUBLICATION WAS LAST PRINTED**

| | |
|---|--|
| <i>Secretary of Agriculture</i> ----- | HENRY A. WALLACE. |
| <i>Under Secretary</i> ----- | RENFORD G. TUGWELL. |
| <i>Assistant Secretary</i> ----- | M. L. WILSON. |
| <i>Director of Extension Work</i> ----- | C. W. WARBURTON. |
| <i>Director of Personnel</i> ----- | W. W. STOCKBERGER. |
| <i>Director of Information</i> ----- | M. S. EISENHOWER. |
| <i>Director of Finance</i> ----- | W. A. JUMP. |
| <i>Solicitor</i> ----- | MASTIN G. WHITE. |
| <i>Agricultural Adjustment Administration</i> ---- | CHESTER C. DAVIS, <i>Administrator</i> . |
| <i>Bureau of Agricultural Economics</i> ----- | A. G. BLACK, <i>Chief</i> . |
| <i>Bureau of Agricultural Engineering</i> ----- | S. H. MCCROBY, <i>Chief</i> . |
| <i>Bureau of Animal Industry</i> ----- | JOHN R. MOHLER, <i>Chief</i> . |
| <i>Bureau of Biological Survey</i> ----- | J. N. DARLING, <i>Chief</i> . |
| <i>Bureau of Chemistry and Soils</i> ----- | H. G. KNIGHT, <i>Chief</i> . |
| <i>Bureau of Dairy Industry</i> ----- | O. E. REED, <i>Chief</i> . |
| <i>Bureau of Entomology and Plant Quarantine</i> ---- | LEE A. STRONG, <i>Chief</i> . |
| <i>Office of Experiment Stations</i> ----- | JAMES T. JARDINE, <i>Chief</i> . |
| <i>Food and Drug Administration</i> ----- | WALTER G. CAMPBELL, <i>Chief</i> . |
| <i>Forest Service</i> ----- | FERDINAND A. SILCOX, <i>Chief</i> . |
| <i>Grain Futures Administration</i> ----- | J. W. T. DUVEL, <i>Chief</i> . |
| <i>Bureau of Home Economics</i> ----- | LOUISE STANLEY, <i>Chief</i> . |
| <i>Library</i> ----- | CLARIBEL R. BARNETT, <i>Librarian</i> . |
| <i>Bureau of Plant Industry</i> ----- | FREDERICK D. RICHEY, <i>Chief</i> . |
| <i>Bureau of Public Roads</i> ----- | THOMAS H. MACDONALD, <i>Chief</i> . |
| <i>Soil Conservation Service</i> ----- | H. H. BENNETT, <i>Chief</i> . |
| <i>Weather Bureau</i> ----- | WILLIS R. GREGG, <i>Chief</i> . |

This circular is a contribution from

| | |
|--|--|
| <i>Bureau of Biological Survey</i> ----- | J. N. DARLING, <i>Chief</i> . |
| <i>Division of Wildlife Research</i> ----- | W. B. BELL, <i>Principal Biologist</i> , <i>Chief</i> . |
| <i>Section of Food Habits</i> ----- | CLARENCE COTTAM, <i>in Charge</i> . |

